REMARKS

Claims 1-32 were pending in the application. By this amendment, claims 1, 8, 10-11, 13, 15, 22, 24-25, and 27 have been amended. Claims 7 and 21 have been deleted and claims 33-36 have been added. As a result, claims 1-6, 8-20, and 22-36 are now pending for examination, with claims 1 and 15 being independent claims. No new matter has been added.

REJECTION UNDER 35 § U.S.C. 103

In the advisory action mailed December 2, 2004, the examiner has maintained the final rejection mailed July 9, 2004, indicating that the Applicants' arguments in Applicants' response mailed October 8, 2004 does not place the application in condition for allowance. In particular, the examiner asserts that Koonen discloses that the BSC/BTS are co-located in column 6, lines 5-19 and FIG. 4 shows the unguided optical beam between the BSC/BTS (14, 16, 32a in FIG. 4) and antenna (36a-n). Applicants' respectfully disagree with the characterization of the reference. For the reasons discussed herein, the Koonen reference does not disclose an unguided optical beam between the BSC/BTS and the remote antenna as is asserted in the advisory action. Accordingly, Applicants' respectfully traverse this rejection for the same reasons as previously discussed in response to the Final Office Action and further in view of the amendment to the independent claims as made herein.

As has been discussed in response to the Final Office Action previously, Applicants' independent claims 1 and 15 recite that the first and second beams of unguided radiation transmitted between the base-station transceiver system and the remote antenna assembly comprise unguided optical beams of radiation. The Examiner acknowledges that Fischer does not disclose a method that includes transmitting an optical signal via a wireless optical link between the base station and the remote antenna.

The Examiner asserts that Koonen discloses "a method of transmitting and providing the first signal includes transmitting an optical signal via a wireless optical link between the base station and the remote antenna," and that it would have been obvious to provide the teaching of Koonen in Fischer's invention in order to reduce the cable loss and improve the performance and

also to provide more flexibility in placing the antenna, for example, in a low cost location." Applicants respectfully disagree and traverse the rejection.

First, Applicants traverse the proposed combination of Fischer and Koonen because Applicants do not agree that the combination is proper and Applicants reserve the right to specifically argue against the proposed combination in the future. However, even if one were to make the combination suggested in the Office Action, the proposed combination fails to disclose or suggest all the limitations recited in Applicants' claims, even before the claims are amended.

As discussed in Applicants' previous response, Fischer, in contrast to Applicants' claimed invention, discloses transmitting an optical signal between a base station and a remote unit by an optical fiber. In particular, Fischer et al. discloses a method and apparatus for sectorizing coverage of a cellular communications area. The system includes a plurality of microcells 100, with each microcell including a remote antenna unit 102. Each microcell antenna unit covers a particular sector and is connected to a sectorized base-station 106 unit by an optical fiber 104. The base-station units are interfaced to a MTSO 110 over T1 lines 112. With this arrangement, digitized streams representative of telephone signals from the MTSO are generated that correspond to the microcell antenna units, are multiplexed together, and are transmitted as a guided optical signal to the remote antenna units by the fiber 104. The remote antenna units de-multiplex the digitized streams into separate digitized streams that correspond to the microcell antenna units, and the separate digitized streams are converted to RF signals.

Similarly, signals traveling from the remote antennas units to the MTSO comprise separate digitized streams that are generated for each microcell antenna unit, which are representative of RF signals received at the microcell antenna units. These separate digitized streams are multiplexed at the remote antenna unit and transmitted to the centralized base-station as a guided optical signal by the optical fiber 104. At the sectorized base-station, the multiplexed digitized streams are demultiplexed into the separate digitized streams corresponding to the microcell antenna units and are converted to RF signals for providing to the MTSO.

Applicants have appreciated that optical fiber lines between the base-station transceiver system and a remote antenna pose implementation problems and can be replaced with the free space optical signals, thus providing a more flexible, easier to install and more robust system. In addition, Applicants have appreciated that they can provide additional infrastructure more flexibly, and more easily with remote antennas that are not microcells of an overall cell, but

instead are remote duplications of the base-station typically beyond the transmitting cell of the BTS, and thus the remote antenna assemblies provide additional cells outside of the cell provided by the BTS, which continues to transmit a wireless RF signal to remote transceivers within the cell of the BTS. The Fischer et al. reference provides no such teachings or suggestions. Further, Fischer et al. does not disclose or suggest that it would have been obvious to modify the disclosure of Fischer et al. to use an unguided optical signal, or to provide remote antennas that are duplications of the BTS and outside of the transmitting cell of the BTS.

Koonen discloses a microwave wireless network (e.g., a cell phone network) wherein one or more base stations communicate with a central base station controller via an optical fiber. According to Koonen, a cellular network may be split into a number of micro-cells that can be connected through a passively split optical fiber network. Referring to FIG. 3, a main fiber 16 coming from the base station controller 14 runs into the heart 18 of a cluster of micro-cells 12 and from there is split into the hearts of seven clusters 20 and then split again to provide the signals among the individual antennas/base stations in the micro-cells 21 (col. 4, lines 5-19).

Koonen discloses that each base station (that communicates with the base station controller over the optical fiber) includes a optical network unit (ONU) that includes both optical components (for communicating with the base station controller) and microwave components (for communicating with the antennas) (col. 4, lines 32-65). Referring to FIG. 4, Koonen discloses that the base station receives microwave signals via antenna 36a, which are coupled onto the signal line 40a by a microwave direction coupler 34 after pre-amplification in the antenna drive circuitry. The electrical signals on line 40a are then presented to the splitter 56a and fed via lines 60a to the optical transmitters 59a where the signals are transferred to the appropriate frequency for transport upstream toward the base station controller (col. 5, lines 42-49). Koonen explains that analog microwave signals are exchanged between each base transceiver station and the co-located antenna and that these analog microwave signals (after appropriate electrical frequency up- and down-conversion) are transported on an optical wavelength channel to the base station controller (col. 6, lines 5-15). In addition, Koonen notes that the optical receivers in the ONU's at the base stations can be switched on and off under the control of control signals 62a so as to realize wavelength channel selection. The generation of these control signals is done at the base station controller and the control signals are sent to the base stations (to the ONU's) via a wired or wireless optical link.

Thus, in summary, Koonen discloses transmitting communication signals between a base station controller and a base station over an optical fiber, and transmitting microwave communication signals from the base station to the antenna. Although Koonen does not specify that the microwave signals are transmitted from the base station to the antenna over a wired link (e.g., a coaxial cable), this is suggested because the signals are sent from the base station to a microwave directional coupler 34a at the antenna. Microwave directional couplers are typically implements using waveguide or coaxial cable. The only wireless optical signals considered by Koonen are control signals that are sent from the base station controller to the base station.

Therefore, Applicants assert that the Examiner is incorrect in stating that Koonen discloses "a method of transmitting and providing the first signal includes transmitting an optical signal via a wireless optical link between the base station and the remote antenna." Koonen makes absolutely no mention of transmitting wireless optical signals (unguided optical radiation) between the base station and a remote antenna. First, as mentioned above, Koonen describes the antenna as "co-located" with the base station, rather than being "remote" as is specified in Applicants' claims. In addition, as discussed above, the only signals Koonen sends between the base station and the antenna are microwave signals and the only wireless optical signals mentioned by Koonen are control signals (not the communication signals that are ultimately transmitted to the antenna) that are sent from the base station controller to the base station. Furthermore, the disclosure of Koonen does not suggest replacing the microwave signals sent between the base station and the antenna with wireless optical signals because 1) Koonen is aware of the use of wireless optical signals (because he suggests using them to transmit control signals from the base station controller to the base station) and 2) the microwave signals sent between the base station and the antenna appear to wired signals, not wireless signals.

In contrast to the disclosures of Fischer and Koonen, Applicants' claimed invention recites the transmission of first and second beams of unguided radiation between the base-station transceiver system and the remote antenna assembly that comprise unguided optical beams of radiation. As discussed above, this is not disclosed or suggested by the prior art references of record, whether taken individually or in combination. In addition, Applicant has amended the independent claims to recite a method (claim 15) and apparatus (claim 1) that comprises a base-station (BTS) 24A, 24B, 24C that receives a composite downlink signal provided from the base-station controller 36 and ultimately from a communication system 32, and that the composite

downlink signal is to be provided via the remote antennas to a plurality of mobile transceivers 47. The BTS of the claimed method and apparatus does not divide up the composite signal in any way, but instead modulates the composite downlink signal onto a wireless optical carrier signal that is transmitted to each of remote antenna assemblies 26A, 26B, and 26C. The remote antenna assemblies are not subcells of the original base-station 24A, 24B, 24C, but instead are remote duplications of the base-station (BTS) and are typically beyond the transmitting range of the base-stations (BTS). In other words, the base-stations (BTS) continues to be able to transmit a wireless RF signal to mobile transceivers 47 within the range of the BTS cell, and the remote antenna assemblies 26 are extensions of these base-stations cells that provide additional cells 42A, 42B and 42C outside of the cells provided by the base-stations 24A, 24B and 24C.

Each of the remote antenna assemblies 26A, 26B and 26C receives the wireless optical signal transmitted by the respective base-station (BTS) and converts the wireless optical signal back to the composite RF signal (the signal is not filtered to data appropriate for only one remote antenna assembly because it is not a subcell) to be communicated to the mobile transceivers 47. In addition, each of the antenna assemblies receives a composite uplink signal transmitted by the mobile transceivers and modulates the composite uplink signal provided by the mobile transceivers onto a wireless optical carrier signal. Each of the antenna assemblies also transmits the wireless optical signal back to the base-station (BTS) which converts the wireless optical signal to the composite uplink signal to be transmitted to the base-station controller 36 and to the communication system 32.

Accordingly, the claimed system and method of the application does not take an existing cell of a base-station and divide it up into a plurality of subcells as is done by the cited references, but instead the BTS transmits the composite signals to the remote antenna assemblies which transmits the composite signals to the mobile transceivers, and the remote antenna assemblies also receive the composite signals from the mobile transceivers and the BTS receives the composite signal from the remote antenna assemblies, as is claimed in amended independent claims 1 and 15. In addition, the claimed system and method of the present application extends the cell coverage area of the base-station to a remote area outside of the transmitting area of the existing base-station (see added claims 34 and 36). Also, the claimed base-stations of the system and method of the application continue to transmit and receive wireless RF signals to mobile

transceivers (see added claims 33 and 35), which is not the case for the BTS of the cited references.

In the system of the present application, transceivers remain in the existing base-station (BTS), as the existing base-station continues to transmit a composite signal. In addition, the remote antenna assemblies need not have individual transceivers since they are receiving a composite signal and simply converting the composite signal to a wireless signal. Accordingly, independent claims 1 and 15 have been amended to recite the composite signal that is communicated between the base-station and the remote antenna assembly, and between the remote antenna assembly and the mobile transceivers. In addition, Applicants have added claims 33 and 35 that add the structure to the base-station of the transceiver for transmitting and receiving the RF signal, so that it is clear that the base-station continues to remain as a fully functional base-station. Further, Applicants have added dependent claims 34 and 36 to recite that the positioning of the remote antennas is outside of the existing coverage area of the base-station. Accordingly, independent claims 1 and 15, and newly added claims 33-36 further distinguish over the cited references for these additional reasons. Withdrawal of the rejection of the independent claims is therefore respectfully requested.

Each of dependent claims 2-4, 8-14, 16-18 and 22-32 depends from one of independent claims 1 and 15 discussed above and is therefore allowable for at least the same reasons as discussed for its respective base claim. Accordingly, withdrawal of the rejection of claims 2-4, 8-14, 16-18 and 22-32 is also respectfully requested.

In the Final Office Action, the Examiner has also rejected dependent claims 5-7 and 19-21 under 35 U.S.C. §103(a) as being unpatentable over Fischer in view of Koonen and in further view of the Examiner's official notice. Applicants respectfully traverse this rejection.

Claims 7 and 21 have been deleted and therefore this rejection is now moot. Further, each of dependent claims 5-6 and 19-20 depends from one of independent claims 1 and 15 discussed above, and is therefore allowable for at least the same reasons as discussed for its respective base claim, because the Examiner's official notice does not challenge the premise upon which Applicants assert that the independent claims are allowable.

Furthermore, Applicants do not agree with the Examiner's assertion (Official Notice) that it is well known to operate a system as described in Applicants' independent claims using the frequencies and distances specified in dependent claims 5-6 and 19-20. Accordingly, Applicants

respectfully request that, if the Examiner wishes to maintain this rejection, that the Examiner provide a prior art reference disclosing the use of the specified frequency ranges and distances in a system as described in Applicants' claims. Absent production of such a reference, Applicants respectfully request that the rejection be withdrawn.

In view of the foregoing, Applicants assert that dependent claims 5-6 and 19-20 are in condition for allowance and respectfully request that the rejection of claims 5-6 and 19-20 be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762.

Respectfully submitted,
Arnon et al., Applicants

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